River Crossings

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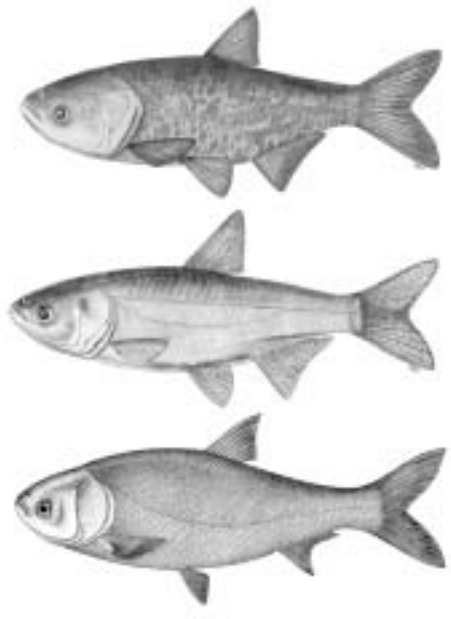
Asian Carp Risk Assessment Completed

A Risk Assessment for Asian carp of the genus *Hypophthalmichthys* (bighead, silver and largescale silver carps) in the U.S. was released in April. The bighead and silver carp were brought into the U.S. in the early 1970s, primarily to control phytoplankton in fish culture ponds and in wastewater treatment lagoons. The largescale silver carp, has not yet been imported into the U.S., but has been introduced into several foreign countries.

The Assessment uses the *Generic Nonindigenous Aquatic Organisms Risk Analysis Review Process* (Risk Assessment Management Committee 1996) and draws on information presented in the full text. It involves rating of the seven elements of risk shown below:
(1) Estimated probability of the exotic organism being on, with, or in the pathway.
(2) Estimated probability of the organism surviving in transit.
(3) Estimated probability of the organism successfully colonizing and maintaining a population where introduced.
(4) Estimated probability of the organism to spread beyond the colonized area.
(5) Estimated economic impact if established.
(6) Estimated environmental impact if established.
(7) Estimated impact from social and /or political influences.

Each element is assigned an estimated level of risk, rated as high, medium, or low.



Bighead, Silver, and Largescale Silver carps (top to bottom).

The degree of certainty associated with risk-level assignment is also expressed for each of the seven elements. Categories for uncertainty include *Very Certain* - as certain as we are going to get; *Reasonably Certain* - certain within reason; *Moderately Certain* - more certain than not; *Reasonably Uncertain* - uncertain within reason; and *Very Uncertain* - a guess. Results of the analysis are displayed in Table 1 and summarized below:

Bighead and Silver Carp - The risk associated with all components of the probability of establishment (organism within pathway, entry potential, colonization potential, and spread potential) was rated high for both bighead and silver carp. Therefore, the probability of establishment earned a high rating. Two components of the consequences of establishment were rated medium to high (economic and environmental impacts), and one was rated medium (perceived or social impacts), requiring that the consequence of establishment be rated as medium to high. The organism risk potential of bighead and silver carp in the U.S., therefore, which combines the probability of establishment and the consequences of establishment, was

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Table 1. Results of an Environmental Risk Assessment of Asian carps of the Genus *Hypophthalmichthys* in the United States.

Rating Element	Bighead Carp	Silver Carp	Largescale Silver carp
1) Probability of being on, with, or in pathway	High - Very Certain	High - Very Certain	Low - Reasonably Certain
2) Probability of surviving transit	High - Very Certain	High - Very Certain	Medium - Reasonably Certain
3) Probability of colonizing and maintaining populations where introduced	High - Very Certain	High - Very Certain	Medium - Reasonably Certain
4) Probability of spread beyond the colonized area	High - Very Certain	High - Very Certain	Medium High - Moderately Certain
5) Estimated economic impact if established	Medium to High - Reasonably Certain	Medium to High - Reasonably Certain	Low to Medium - Moderately Certain
6) Estimated environmental impact if established	Medium to High Reasonably Certain	Medium to High - Reasonably Certain	Medium - Reasonably Certain
7) Estimated impact from social and/or political influences	Medium - Reasonably Certain	Medium - Reasonably Certain	Medium - Reasonably Certain

determined to be a high, or an unacceptable risk. This classification justifies mitigation to control negative effects and means that bighead and silver carp are organisms of major concern for the U.S.

Largescale Silver Carp - The risk associated with being in the pathway was rated low, the entry potential and colonization potential were rated medium, and spread potential was rated medium to high for largescale silver carp. These ratings for the components of the probability of establishment require a low rating for largescale silver carp. Two components of the consequences of establishment were rated medium (environmental and perceived or social impacts), and one was rated low (economic impacts), requiring that the consequence of establishment be rated as medium for largescale silver carp. The organism risk potential of largescale silver carp in the U.S., therefore, was determined to be medium, or an unacceptable risk. This classification justifies mitigation to control negative effects and means that largescale silver carp are organisms of moderate concern for the U.S.

Findings published and used in the Assessment include the following:

- Bighead and silver carps have been reproducing in natural waters of the U.S. since at least 1989 and 1995, respectively, and both species continue to expand their range and increase in abundance.
- Bighead carp have been collected from waters of 23 U.S. states and one Canadian province (Ontario).
- Silver carp have been collected from 16 U.S. states and Puerto Rico.
- Bighead and silver carps have been, and remain in, the U.S. pathway (as evidenced by growing, self-sustaining populations.
- Both bighead and silver carps have survived transit from countries of origin into the U.S.
- Both bighead and silver carp have survived transit in live-haul trucks within the U.S. and Canada and there is a high probability of individuals of each species surviving transport for use as baitfishes.

River Crossings

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A Message From the Chairman

As most of you know I am ending my service as chair person of MICRA this summer and Mike Armstrong of Arkansas will be taking over the reigns in July. I have enjoyed the experience and considered it a great opportunity to make a difference for the resource.

As I look back on the past two years, I feel good about the accomplishments made by our Association. We were able to regain the services of our coordinator, sponsor the first regional workshop of the National Fish Habitat Initiative in Kansas City, continue our fine committee work, advocate for ANS prevention and control, resume publication of River Crossings, sponsor the Mississippi River Basin Panel on ANS, become an affiliate member of the Midwest Association of Fish and Wildlife Agencies, and sit on the national Aquatic Nuisance Species Task Force as an ex-officio member, along with many other accomplishments.

I am confident that our new chairman will build on the current successes of the Association. Mike Armstrong has already provided the Executive Board with a look at the direction he will lead the group. Mike would like to focus on habitat issues, strengthening the relationship between MICRA and the sub-basins, and continue the existing efforts. I urge you to support Mike during his tenure.

I would like to thank the members of the Executive Board, committee chairs, and Jerry Rasmussen for their invaluable support. It was a pleasure to work with this group of dedicated scientists. I plan to stay involved with MICRA in the future and use it to benefit the aquatic resources of my home state, Kansas.

Doug Nygren

Doug Nygren
Fisheries Section Chief
Kansas Department of Wildlife and Parks

- Silver carp succumb to handling stress and experience poor survival for live marketing purposes.
- Smaller individuals of both bighead and silver carp species may be transported purposefully or accidentally by anglers or baitfish dealers and released into uninfested waters.
- Less is known about the ability of largescale silver carp to survive transport than for bighead and silver carps, but the similarity of largescale silver carp to silver carp suggests that it could survive transit to the U.S.
- Appropriate habitats (lakes, ponds, reservoirs, canals, rivers, streams, and associated backwaters), a hospitable climate, and abundant food resources to support all three species are found in much of the U.S.
- Preferred food of bighead carp is zooplankton whereas silver and large-scale silver carps prefer phytoplankton.
- All three species can consume other foods as well.
- Both zooplankton and phytoplankton are locally abundant in U.S. waters, especially in large rivers and reservoirs.
- Both bighead and silver carps have demonstrated abilities to colonize and maintain populations in the U.S. and other countries.
- On the basis of its native distribution, it would appear that pure stock of the subtropical and tropical largescale silver carp has potential to survive and perhaps become established if introduced in southern Florida and Hawaii, and perhaps in southern Texas.
- Lack of access to suitable rivers for spawning may preclude largescale silver carp spawning.
- Populations of bighead and silver carp appear to be increasing exponentially in some areas.
- Because the largescale silver carp is closely related to the silver carp, it is reasonable to expect that it has a similar ability to spread from the point of introduction.
- The presence of similar climate and habitat in the U.S., as in the native range of bighead and silver carp, indicates that these species may eventually dominate fish communities in suitable waters.
- It appears that native predators are unable to significantly reduce expanding populations of bighead and silver carps.
- Because bighead and silver carp feed on plankton, their diets overlap to some extent with the young of virtually all native fishes, and all life-history stages of planktivorous species, including fishes and invertebrates.
- If food resources become limiting, bighead and silver carps may compete directly with plankton feeding native species. Because many native fishes are important as sport and food species, their decline would result in a negative economic impact on recreational angling and other industries that benefit from sport fishing, such as tourism.
- Bighead and silver carps now outnumber the catch of native species sought after commercially in several waters of the Midwest.
- Recent (2004) deployment of a hoop net in the Red River, LA, caught approximately 408 kg of bighead, silver, and grass

A boatload of Asian carp — a day's catch on the Illinois River

carps, and no native fishes.

- Between 2002 and 2004 in the lower Missouri River, using methods similar to those most often used by local commercial fishers, more than twice as many bighead and silver carp were caught than all other commercial species combined. Commercial species were not weighed, but the average weight of individual *Hypophthalmichthys* was estimated to be at least double that of the individual commercial species caught. This indicates that in some areas there exists a negative economic impact to persons who depend upon commercial fishing targeting native species for their livelihoods.
- There is the possibility that some negative economic impacts could be reduced if the market for bighead and silver carps from commercial fishers improves. This, however, would present competition with aquaculturists raising the bighead carp in particular for sale in ethnic markets.
- Presently, only a limited, low value bighead carp market exists.
- The jumping behavior that silver carp exhibit in response to boat engine noises has potential for negative economic effects to areas they invade.

Boat operator nearly hit by a jumping silver carp.

- Reports of large jumping silver carp seriously injuring boaters, their equipment, and water-skiers are becoming more frequent.
- Recreational anglers and personal watercrafters report a growing number of injuries including cuts from fins, black eyes, broken bones, back injuries, and concussions.
- Silver carp also cause property damage such as damages to boats that range from minor to severe, including broken radios, depth finders, fishing equipment, and antennae.
- When a jumping silver carp lands in a boat, it often leaves slime, scales, feces, and blood for boaters to contend with.
- Threat of personal injury, perhaps even human deaths, and damage to personal property is likely to reduce the amount of recreation occurring in invaded waters and may reduce the money brought into the region for such activities.
- Declines in native fishes, particularly of planktivorous species, are well documented from several other countries in which bighead and silver carp have been introduced.
- Given examples of declines in native fishes after the introduction of bighead and silver carps, it is reasonable to expect similar declines in native fishes in the U.S., particularly those that rely heavily on plankton as a food resource.
- Extirpations and extinctions of native and endemic fishes have been linked to the introduction of bighead and silver carps elsewhere, although in these events, these fishes were not the only nonnative species indicated, and other factors, such as water removal and habitat degradation played roles in those events.
- Virtually all native fishes rely on plankton during larval and early juvenile stages and because *Hypophthalmichthys* frequently occur in high densities, the potential for competition with early-life stages of native fishes could be quite high.
- *Hypophthalmichthys* are known to occupy the same habitats as some native species in the U.S.
- Competition for habitat between *Hypophthalmichthys* and native species is probably high, especially in large rivers, lakes, and reservoirs.
- Because species of the genus *Hypophthalmichthys* are not native to waters of the U.S., there is little possibility of hybridization or interbreeding with native fishes, although *Hypophthalmichthys* can hybridize with each other and the resulting offspring are fertile.
- Potential for *Hypophthalmichthys* to cause habitat degradation is probably low, since they are planktivorous, but this is incompletely understood.
- Changes in water quality and sediment chemistry are possible.
- Adverse effects of *Hypophthalmichthys* on native wildlife and wildlife resources, exclusive of fishes, would probably be minimal. One possible exception is freshwater mussels that rely on plankton for filter feeding and many are already imperiled because of habitat degradation and invasion by the zebra mussel (*Dreissena polymorpha*).
- The effects of filter feeding and nutrient cycling by introduced *Hypophthalmichthys* in the U.S. could significantly alter trophic interactions in areas where these fishes come to dominate the fish community.
- Potential to transfer pathogens (parasites, diseases) remains largely unknown.
- Both bighead and silver carps are hosts for the Asian carp tapeworm, a cestode capable of being transferred to other fishes of several different orders. Although this tapeworm has minimal effects on the host carps, it is capable of causing severe damage to the intestines of novel hosts that can lead to death. This parasite has been found in several species of native North American fishes including several endangered species.
- Bighead, silver, grass, and black carps are known to host the Asian carp tapeworm, but it is unknown whether largescale silver carp hosts this species.
- Adverse effects on Threatened and Endangered Species would probably be high, particularly through possible transfer of the Asian carp tapeworm to those fishes.
- Candidate Threatened and Endangered fish taxa, such as paddlefish, would likewise be at risk because of the potential direct competition for food and habitat.
- The likelihood and magnitude of effects on designated critical habitats of Threatened and Endangered Species could be significant.
- Where low water velocity habitat may be limiting for native fishes, for example, in the channelized Missouri River, presence of large numbers of large and active bighead and silver carps could force native fishes from preferred habitats.
- Should these Asian carps become abundant, the most likely result would be an alteration of habitat use by native fishes.
- The most likely habitats affected would be rivers, larger tributaries, lakes, ponds, reservoirs, and perhaps canals.
- Habitats that would be most at risk would be low velocity, deep water areas and backwaters where bighead and silver carps are most abundant.
- The possibility that carps of the genus

Hypophthalmichthys could bring about the risk of extinction of native fishes is presently unknown, but losses of endemic fish biodiversity are documented associated with the introduction of bighead and silver carps.

- Fish species that would be most at risk of extinction are those that are planktivorous throughout their life-history stages but larval and juvenile stages of many species could be adversely affected.
- There is likelihood that damage to ancillary fisheries resources through control measures will be substantial.
- Netting and electrofishing could be effective in reducing populations of bighead and silver carps, but they would also affect native fishes present in the area where such control measures are used.
- Use of piscicides, such as rotenone, would be expensive (perhaps prohibitively so), only locally effective, and would negatively affect all fishes and invertebrates, not just the target carps.
- Even most nonlethal methods to prevent the spread of bighead and silver carps, such as electrical barriers or bubble curtains, would negatively affect migratory native fishes. This effect could be minimized, however, if somewhat species-specific sonic barriers could be developed.
- Treatment of ballast water in vessels moving from waters containing reproductive populations of bighead and silver carps to waters devoid of these fishes may become necessary.
- At present, there is no method known to substantially reduce populations of bighead and silver carps. On the basis of presently available technology, eradication is not possible.
- If negative impacts become significant over time, it is reasonable to expect that pressures to control these fishes in the U.S. may grow and eventually involve political influences.

With the risk assessment now saying that (1) the organism risk potential of bighead and silver carp is high or unacceptable, (2) mitigation to control negative effects is justified, and (3) silver and bighead carp are organisms of major concern in the U.S.; the obvious question now is: Will these species be listed as injurious under the federal Lacey Act. For the answer to that question, readers are referred to: Kari Duncan (703) 358-2464 or Erin Williams (703) 358-2034 with the U.S. Fish and Wildlife Service in Washington, D.C.

Source: Kolar, C.S., D. C. Chapman, Courtenay, W.R., Jr., C.M. Housel, J.D. Williams, and D.P. Jennings. 2005. *Asian Carps of the Genus Hypophthalmichthys (Pisces, Cyprinidae) ~ A Biological Synopsis and Environmental Risk Assessment*. USGS/BRD Report to the U.S. Fish and Wildlife Service per Interagency Agreement No. 94400-3-0128, April 12, 2005. La Crosse, WI.

Full copies of the Risk Assessment can be found on-line at: http://www.fws.gov/contaminants/Library.cfm

MRB/Great Lakes Invasive Species Summit Recommendations

On March 30 Chicago Mayor Richard M. Daley and U.S. Fish and Wildlife Service Regional Director Robyn Thorson released an Executive Summary of the *Aquatic Invasive Species Summit* held in May 2003 to address problems associated with connecting channels between the Mississippi River Basin and the Great Lakes. These canals are responsible for allowing invasive organisms such as the zebra mussels access to the rivers of the Mississippi River Basin and now threaten to allow Asian carp to invade the Great Lakes. Seventy experts from around the world gathered in Chicago two years ago to explore solutions to that problem.

Recognizing that the impact of invasive species on ecosystems can be permanent and irreversible, the goal of the summit was to find a long-term solution. A host of ideas were discussed, but the following three general approaches emerged, all of which require more information regarding their effectiveness and feasibility:

- Completely separate the waters of the Great Lakes and Mississippi River basins by creating a physical or other type of barrier in the Chicago Canal System in order to cause a hydrologic separation of the basins;
- Establish a biological eradication zone — a reach of the Chicago Canal where methods such as removing oxygen from the water, maintaining high temperatures, or applying chemicals would eradicate most aquatic organisms; and
- Employ technologies that affect animal behavior (e.g., electric and/or acoustic technologies) to deter fish from advancing through the Chicago Sanitary and Ship Canal.

Overall, summit participants stressed that an integrated, decisive, proactive approach of control and prevention, employing short- and long-term solutions and combined technologies, is needed to increase the likelihood of reaching the goal of 100% effectiveness. The scientists also stressed the importance of engaging a broad audience — local, national and bi-national in nature — to create a coalition of entities possessing diverse interests (e.g., commercial navigation, recreational boaters and wastewater and stormwater agencies), to plan and implement a solution.

The following three action items were developed:

1. Separate the Two Basins - A project should be established that would result in the hydrologic separation of the Great Lakes and Mississippi river basins within 10 years. This long-term solution should consider options including lock modifications and the placement of physical barriers at one or more locations in the Chicago Canal, or other means. Careful assessment is needed in pursuing this approach as navigation, wastewater and stormwater challenges exist. A feasibility study should be conducted and completed within 2 years of the appropriation of funds. The agency receiving authority to perform the feasibility study should bring together experts to investigate and conduct a comprehensive study of various approaches to hydrologic separation of the two basins. The study team should be established under the direction of a local lead, be interdisciplinary and include appropriate representatives from governmental agencies, universities and the private sector. Representatives should include consulting engineers, hydrologists, aquatic biologists, economists and other professionals who represent the highest level of expertise.

2. Develop Additional Technical Barriers - The existing Dispersal Barrier Advisory Panel (DBAP) should continue to operate with input from summit participants, local stakeholders and others to recommend technological alternatives and solutions to augment the existing electric barrier and the planned second electric barrier in the Chicago Sanitary and Ship Canal. The Army Corps of Engineers should remain

the action agency in implementing these recommendations. The DBAP should lead the development of concepts for additional technological barriers with the goal of developing recommendations within one year. Additional federal funding is urgently needed to investigate promising new technologies.

3. Procure Broad-Based Political Support and Federal Funding - The consequences of the transfer of aquatic invasive species between the Great Lakes and Mississippi drainages affect many states and provinces in the U.S. and Canada. Support for developing and implementing solutions should reflect this scope of interest. Work should begin immediately to develop strategies for creating broad-based political support and funding mechanisms. A coordinating body comprised of the city of Chicago, Metropolitan Water Reclamation District of Greater Chicago, Great Lakes Mayors, International Joint Commission, Great Lakes Commission, Great Lakes Fishery Commission, Mississippi Interstate Cooperative Resource Association, Northeast-Midwest Institute, state legislators and officials and federal legislators from Great Lakes and Mississippi River basin states, among others, should be established to guide the funding process for the feasibility study, the recommended actions needed for the long term hydrologic separation of the basins and the short term alternative strategies to be implemented.

Contacts: Chicago Dept. of Environment (312) 744-7606 and U.S. Fish and Wildlife Service (847) 381-2253

NZ Mud Snails in the S. Platte River?

It comes more as a disappointment than a surprise that a second Colorado river is likely infested with New Zealand mud snails, state wildlife officials reported. The newest find is on the South Platte River from the Elevenmile Reservoir Dam to about seven miles downstream. The Colorado Division of Wildlife has not confirmed that the snails are the invasive species from New Zealand, but they are believed to be.

The tiny invaders (less than a quarter-inch long) were confirmed in Colorado for the first time last November when they were found in the city of Boulder's Boulder Creek between Valmont Road and 95th Street. "It's certainly not unexpected, mainly because we are looking for them before the runoff begins," said Eric Hughes, state Division of Wildlife aquatic manager. He said the latest discoveries were made by two anglers.

The mud snail, a native of New Zealand, spread to Europe in the late 1880s and then to the U.S. in 1987, where it was first discovered in the Snake River in Idaho. It once was thought that the snails reproduced so effectively they would cover the streambed and displace other invertebrates that are food for trout and other fish. But Hughes said it's now believed their numbers peak quickly then stabilize in a small area.

Source: *Rocky Mountain News*, 5/2/05

Judge Orders EPA to Enforce Ballast Water Regulations

Judge Susan Illston, in the U.S. District Court for the Northern District of California, ruled in late March that ballast water from ships is not exempt from U.S. EPA regulations. The water, which improves ship stability, is of concern because it often carries exotic invasive species such as the Asian clam, zebra mussel, and round goby. The judge cited research showing that more than 10,000 marine species each day transit the globe in the ballast water of cargo ships, and that damage inflicted by one species — invasive zebra mussels — has cost tens of millions of dollars in the Great Lakes states alone.

EPA officials argued that other federal efforts, such as Coast Guard initiatives, to control invasive species in ballast water were better suited to solving the problem than the Clean Water Act's (CWA) permit process. They said it would require the writing of permits for tens of thousands of commercial cargo vessels and fishing boats. But Judge Illston said the EPA had gone beyond its authority by exempting ballast water from the CWA permit requirements.

Environmental groups brought the suit against the agency after it denied their petition on regulating ballast water discharges in 2003. "This will hopefully be a landmark decision that will dramatically reduce the introduction of invasive species into U.S. waters," said Warner Chabot of the *Ocean Conservancy*, a plaintiff in the case. But *Pacific Merchant Shipping Association* spokesman John Berge said enforcing the CWA on ballast water discharges could be tricky, "Because ships are mobile, it's difficult to tell what's in the ballast and what level of pollutant is in it."

Melissa Powers, attorney with the *Pacific Environmental Advocacy Center,* said that if the ruling stands, "All vessels are going to have to figure out a way to treat ballast water before discharging it in the waters of the United States." But Powers said she expects the EPA to appeal the ruling. The parties have already sparred over whether the district court had jurisdiction and that question could be grounds for an appeal. EPA officials said they are still deciding whether to appeal the decision.

Sources: Joe Rojas-Burke, Portland *Oregonian*, 1/4/05; Kellie Schmitt, *San Jose Mercury News*, 4/1/05; and *Greenwire*, 4/1/05

Ships of the Future - No Ballast Water

The ocean going vessel, *E/S Orcelle* (E/S stands for Environmentally Sound), is being designed by Scandinavian vessel designing firm *Wallenius Wilhelmsen* to release zero emissions into the atmosphere and no operational discharges into the sea.

Conceptual views of the E/S Orcelle.

The ship will be powered by renewable energy sources, including solar, wind, and wave energy, in combination with a fuel cell system powered by hydrogen. Some of the hydrogen for the fuel cells will be produced on board by solar, wind and wave energy. The only by-products of

the production of electricity from fuel cells are water and heat.

The *E/S Orcelle* will have five hulls; a long, slender main hull and four support hulls, or sponsons, to provide stability at sea. The (1) stability offered by the pentamaran hull and its fins, (2) elimination of a traditional stern propeller and rudder, (3) use of new propulsion systems, and (4) use of lightweight materials, including aluminium and thermoplastic composites will all contribute to eliminating the need for ballast water. In addition, the pentamaran hull design will contribute to the improved utilization of energy and to the clean flow of water around vessel.

Conceptual work on the *E/S Orcelle* began in 2004 and is continuing. *Wallenius Wilhelmsen* envisions a service date of 2025 for this environmentally friendly carrier.

Source: http://www.2wglobal.com/expo2005/english/zeroEmissionCarrier/index.jsp

NAISA 2005 Introduced

Aquatic invasive species cause enormous economic and environmental damage in the U.S. each year. They are second only to habitat destruction as a cause of permanent losses in biological diversity of aquatic ecosystems. The National Aquatic Invasive Species Act (NAISA) of 2005 recently introduced into both houses of the U.S. Congress as Senate Bill 770 and House Bill 1591 if passed and signed into law will:

- end the easy access that invasive species have had into U.S. waters through ships' ballast water;
- establish a grant program to assist state efforts to prevent the spread of invasive species in ecosystems; and
- fund research, education and outreach programs to help control aquatic invasive species.

Ballast Water Controls - Ships are the primary pathway by which aquatic invasive species hitch rides into U.S. coastal waters, either by adhering to the hulls of commercial ships or by traveling in their ballast water. Today, ships move more than 80% of consumer goods, and the steady growth in global trade is increasing the opportunities for invasive species to reach new habitats. NAISA would strengthen the mandatory National Ballast Water Management Program for all ships operating in U.S. waters by establishing minimum requirements for all ships (coastal and transoceanic) to address aquatic invasive species, and set a timeframe for compliance. The legislation would require the U.S. Coast Guard and the U.S. EPA to set an environmentally protective standard to prevent introduction of invasive species by commercial ships. Defining an environmentally protective standard for ballast water technology will assure protection of vital ecosystems, guarantee safety for ships, and spur technology development.

Other Pathway Controls - In addition to ballast water, other pathways exist for the introduction of aquatic invasive species. NAISA would direct the federal government to identify and develop recommendations for management of pathways that pose the highest risk. One such pathway is the importation of nonindigenous species for use as live food, in aquaculture, in the pet and aquarium trade, and for fish stocking. Even organisms not intended to be released into open water can escape or may become invasive. Under existing law, there is no uniform, systematic process for screening or regulating the proposed importation of live organisms. NAISA would establish a common screening process for all imported species, regardless of planned use. The goal of the legislation is to identify potential problems early and take appropriate action to prevent them. MICRA has been especially interested in promoting the establishment of a national species screening process.

Early Detection and Rapid Response - Past invasions teach us that time is critical in mounting an effective and affordable response. NAISA would support the development and implementation of state aquatic invasive species management plans that create a process to detect and respond to new invasions if they occur, and make federal funds and resources available for rapid response activities to stop the spread of invasive species. In addition, the legislation would ensure that prevention and control measures are done in an environmentally sound manner.

Education and Outreach - The public plays an important role in preventing the spread of aquatic invasive species. NAISA would create education and outreach programs to inform the public on preventing transfers of invasive species by proper cleaning of recreational boats and proper disposal on nonindigenous organisms for home aquaria.

Research - Research is critical to understanding how to best prevent the introduction of invasive species, as well as to improve control and eradication efforts and guide cost-effective resource allocation. NAISA would establish an aquatic research program to support early detection and rapid response to new invasions; and, to answer policy-related questions on how to best prevent species from being introduced and becoming established in U.S. waters.

A similar bill was introduced, but did not pass in the last Congress. S. 770 and H.R. 1591 will need broad public support to gain passage because lobbies for all of the effected individuals and industries are expected to again work hard to prevent its passage. Until a bill like NAISA is passed, invasive species will continue to spread largely unchecked across the U.S., and effected industries and individuals will continue to be able to externalize the cost of doing their business to the taxpayer.

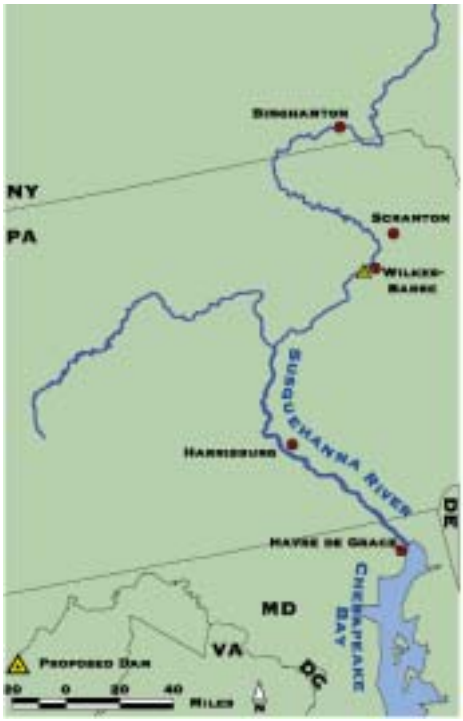
Most Endangered Rivers of 2005

The advocacy group *American Rivers* has declared the Susquehanna River (NY, PA and MD) as the number 1 most endangered river of 2005. The numbers 2, 5, and 7 most endangered rivers on their list occur in the Mississippi River Basin. These are (2) McCrystal Creek (NM), (5) Roan Creek (TN), and (7) Little Miami River (OH).

The annual *America's Most Endangered Rivers* report is intended "as more than a warning: it offers solutions, identifies those who have the power to save the river, and highlights opportunities for the public to speak out." The report is compiled by *American Rivers* from nominations submitted annually by thousands of river groups, conservation organizations, outdoor clubs, and individual activists. Over the past 20 years, 399 organizations have participated in the effort. *American Rivers'* staff and scientific advisors review the nominations for:

- The magnitude of the threat to the river,
- A major turning point in the coming year, and
- The regional and national significance of the river.

Susquehanna River - The Susquehanna River begins near Cooperstown, NY and flows 444 miles through Pennsylvania before broadening into a vast tidal estuary at Havre de Grace, MD. Draining 27,510 square miles — more than any other American river on the Atlantic coast — the Susquehanna contributes half the freshwater flows to the Chesapeake Bay, the largest estuary in North America. The Chesapeake was once the most productive estuary in the world, but today excessive nutrients in polluted runoff from farms and urban areas, and untreated and poorly treated sewage cloud the water, suffocate fish, kill underwater grasses, and devastate oyster and crab harvests.



Throughout the Susquehanna River watershed, aging sewer systems discharge enormous volumes of raw or poorly treated sewage. Unless local, state, and federal lawmakers invest in prevention and cleanup, the Susquehanna will remain among the nation's dirtiest rivers and more and more of the Chesapeake Bay will become a dead zone. EPA data reveals that deficient sewer systems are found throughout the Susquehanna River watershed.

Even where wastewater treatment is provided, it is largely inadequate and fails to use available technologies that remove excess nutrients and pathogens from discharged effluent. Of 123 large sewage dischargers in the Pennsylvania portion of the Susquehanna basin, the *Chesapeake Bay Foundation* has determined that nitrogen discharges from 97 of them are "unacceptable." According to the EPA, the Susquehanna contributes about 40% of the nitrogen and 20% of the phosphorous that flows into the bay. Much of this runoff comes from agricultural and urban sources, in addition to raw or poorly treated sewage.

Economists have estimated that the drinking water, waste assimilation, recreational use, electricity production, seafood harvest, tourism, and other benefits of clean water in the Chesapeake Bay watershed contribute more than $1 trillion to the region's economy each year. If elected officials aren't willing to invest the resources necessary to clean up the Susquehanna River and restore the Bay, an irreplaceable piece of America's natural and cultural heritage will be lost.

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McCrystal Creek - McCrystal Creek and much of the pristine Valle Vidal area that surrounds it face the prospect of intrusive coal bed methane drilling. The Valle Vidal, or *Valley of Abundant Life*, is a 100,000-acre unit of the Carson National Forest in northern New Mexico's Sangre de Cristo Mountains. McCrystal Creek drains the eastern portion of this wondrous landscape, including areas that may be opened for drilling.

McCrystal Creek and its largest tributary, North Ponil Creek, have been identified by the Forest Service as possessing outstanding ecological and cultural values and being sufficiently pristine for inclusion in the National Wild and Scenic Rivers System. The valley boasts exceptional numbers and varieties of fish and wildlife, including Rio Grande cutthroat trout, black bears, mountain lions, and the largest elk herd in the state, as well as remarkable scenery and recreational opportunities.

Meanwhile, one of America's largest natural gas companies, *El Paso Corporation*, seeks to drill up to 500 wells in 40,000 acres of Valle Vidal, including the entire McCrystal Creek watershed. If the area is opened for gas extraction, the wells and associated infrastructure could pollute McCrystal Creek, damage its pristine watershed, kill its fish, and drive away wildlife. Coal bed methane drilling extracts natural gas trapped within a coal formation or seam by water pressure. This method releases millions of gallons of groundwater from the coal seam which can contain dangerously high levels of dissolved solids, toxins, salts, and carcinogens and is often discharged in such large volumes that it scours out the receiving stream. The intensive drilling proposed by *El Paso Corporation* would be accompanied by a dense web of roads, pipelines, well pads, and compressor stations in the primary wintering range for the area's 2,500 elk, forcing the animals to abandon critical winter habitat, disrupting reproduction and herd movements.

A View of McCrystal Creek Watershed

Ironically, another energy company, *Pennzoil Corporation*, donated the Valle Vidal to the American public in 1982 for its outstanding wildlife and recreational values. The U.S. Forest Service has invested heavily in protecting and enhancing the Valle Vidal's special wildlife population and initially resisted overtures by *El Paso Corporation* to drill in the area — until, according to *American Rivers*, the White House Energy Task Force began to intervene aggressively. In August 2004, the *Los Angeles Times* quoted an anonymous Forest Service official, who described "almost weekly" phone calls from the White House.

The Valle Vidal and McCrystal Creek's pristine waters, clean air, scenery, and wildlife are irreplaceable assets for the nearby communities of northern New Mexico whose economies are heavily dependent on the Valle Vidal for recreation income. *American Rivers* says that the reputation of the U.S. Forest Service is also on the line. If the agency succumbs to White House pressure to develop lands donated to the American people for their enjoyment, it will compromise public faith in similar promises in the future.

This Spring the U.S. Forest Service will release a draft of their "Proposed Action," detailing what activities will be allowed to take place in the Valle Vidal. The period of public notice and comment following the release of the "Proposed Action" will be the first chance for the public to speak out against drilling in the Valle Vidal. After finalizing the study, the agency will complete its Forest Plan Amendment for the Valle Vidal Unit in late 2005, officially determining whether the proposed drilling can proceed. The public will then have another opportunity for input.

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Roan Creek - The streams and rivers of the Appalachian Mountains have largely escaped the scourge of factory dairy farming — but that may be about to change for Tennessee's Roan Creek. Unless Tennessee officials establish and enforce stricter rules, cow manure could foul the stream, expose residents to disease, and jeopardize the region's economic prospects.

A View of Roan Creek

Roan Creek, located in the eastern corner of Tennessee, begins near the town of Trade and flows 20 miles into Watauga Reservoir. Roan Creek drains an Appalachian valley of small farms, country stores, scenic byways, and fishing holes. In 1998, the *Tennessee Rivers Assessment Project* identified Roan Creek as a river of "local significance, fully supportive water quality, and an excellent fishery."

Just seven years later, the river's pollution problems are a grave concern. Mountain City's sewage treatment system is now so inadequate that last year plant operators were caught spreading sewage sludge on frozen ground within Roan Creek's watershed in the middle of the night. Agriculture, quarrying, and gravel mining practices have also contributed to the stream's decline.

According to *American Rivers*, factory farms have already blighted large areas of neighboring North Carolina, and many Johnson County residents oppose construction of an industrial dairy operation that will further pollute Roan Creek. Two companies, *Maymead Inc.* and *High Mountain Holsteins*, propose to confine 699 milk cows in a large barn in a residential neighborhood outside of Mountain City. The cows would produce more than 12 million gallons of animal waste each year. That is more than the sewage produced by the 18,000 people living in Johnson County. The liquid animal waste will be stored in huge lagoons on a Roan Creek tributary.

Concentrated animal feeding operations, better known as factory farms are notorious water polluters. If completed, the dairy facility could foul the Roan in several ways. Liquid manure could seep into groundwater below the holding ponds, contaminating nearby wells, springs, and Roan Creek. Once the lagoons fill up, manure will be spread onto farm fields, which could later wash into Roan Creek. Most ominously, the manure lagoons could spill during a storm, sending a wave of liquid manure down the valley and eventually into Roan Creek.

Bacteria, viruses, mold, heavy metals, antibiotics, hormones, and noxious gases escape the lagoon pits into the surrounding air and water, threatening the health of workers and neighbors. The stench irritates noses, eyes, and lungs up to a mile away. The list of ailments associated with factory farms includes *salmonella*, *E. coli*, *listeria*, *cryptosporidium*, blue baby syndrome, bronchitis, asthma, miscarriages, and more. In fact, factory farms cause so many waterborne and respiratory illnesses that in 2003 the *American Public Health Association* called for a national moratorium on their construction.

Researchers at Iowa State University have implicated factory farms for tearing the social fabric of rural life — depressing property values, curbing business growth, and driving away residents. All this would be devastating to an impoverished county whose economic future hinges on the promise of fresh air, clear water, and clean country living to attract new residents, visitors, and businesses.

Some 1400 local residents petitioned state officials in opposition to the original permit to build the factory farm. The permit, issued by the Tennessee Department of Environment and Conservation, appears to violate the agency's own rules, which state that the agency "cannot authorize additional loadings of the same pollutants" into streams that are already polluted. *American Rivers* says the department should act responsibly and withdraw coverage for the factory farm.

The Tennessee legislature will be asked to revisit state laws that govern factory farming, and also to review the rights of citizens regarding current agency practices. The legislature will then have the opportunity to provide Tennesseans with stronger recourse when factory farms poison wells, pollute air or water, or depress property values. This would encourage factory farms across the state to be better corporate citizens. Meanwhile, Mountain City and small towns throughout Appalachia need federal and state assistance to acquire the state-of-the-art sewage treatment plants that will protect the rivers that are the heart of their communities.

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Little Miami River - Proposed wastewater plant expansions and new bridges and roads are poised to pollute Ohio's Little Miami River with more sewage, stormwater, chemicals, and trash. According to *American Rivers*, unless the state insists on modern sewage treatment and sensible transportation planning, the crown jewel of Cincinnati's and southwestern Ohio's outdoor destinations could be sullied beyond recovery.

The Little Miami originates near Clifton Gorge State Nature Preserve, outside of Dayton, and flows south through gorges, wooded bluffs, and rolling farmland. The river empties into the Ohio River on the rapidly growing eastern fringe of metro-

politan Cincinnati. The Little Miami River is home to dozens of fish species, including three state endangered fish, and more than 250 bird species. At least three million people live within an hour's drive of the Little Miami River, and according to official estimates, more than 100,000 people canoe the river and over 200,000 enjoy riverside trails each year. Although the river is part of the National Wild and Scenic Rivers System, its water becomes progressively more polluted as it flows past each of the 20 aging sewage treatment plants.

A view of the Little Miami River

During the late summer and other low-flow periods, up to 70% of the water in the lower reaches is sewage plant effluent. One of those plants, Sycamore Creek Sewage Treatment Plant, chronically violates its discharge permits by releasing untreated sewage into a tributary of the Little Miami. Despite this, the Ohio Environmental Protection Agency (EPA) granted a permit to expand its operations without repairing a leaky collection system and without upgrading to the most sophisticated treatment technology available. The plant will be authorized to dump up to 32 million gallons of inadequately treated wastewater containing germs and high levels of pollutants like nitrogen and phosphorus into the river each day. The Ohio EPA is also reviewing expansion applications for up to seven other sewage treatment plants along the lower river.

Beyond that, road construction and the subsequent real estate development boom threaten to make these pollution problems much worse. The U.S. and Ohio Departments of Transportation are planning the *Eastern Corridor Project*, a package of proposed new roads and bridges intended to speed traffic through Cincinnati and its eastern suburbs and exurbs. A key aspect of this project is a $1.4 billion bridge and highway project through ten miles of the Little Miami River Valley that would seriously harm the river and its watershed. The likely site for the bridge would be in the "Horseshoe Bend" reach that supports the largest variety of animals along the entire length of the Little Miami. The highway would spur development in the valley, and the new big box stores, strip malls, and other development would increase the amount of polluted stormwater running into the river as well as further stress the region's already inadequate sewage treatment infrastructure.

The Ohio EPA could rule on applications for expansion of several sewage treatment plants at any time. The state should require all plants in the watershed to fully modernize their treatment technology when upgrading to ensure that illegal spills of untreated sewage end, and that treated wastewater will be within national Clean Water Act water quality standards. Communities in the Little Miami watershed also need federal and state assistance to acquire modern treatment facilities and expand mass transit in the Little Miami River Valley.

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Resolution Signed by Eight Missouri River Governors

Despite years of contentious disputes and lawsuits over river flows, all eight governors of Missouri River Basin states have agreed to a resolution to save water in the Missouri River. Crafted by state natural resource agency officials, the resolution calls upon the Corps of Engineers to "undertake its best efforts to conserve water in the main stem reservoirs to the extent legally permissible." The resolution also lends support for the Corps to receive full funding in its efforts to address fish and wildlife recovery, improving water infrastructure and water conservation.

"Everyone finally came together to agree this is an issue that needs to come to the attention of the Corps of Engineers," said Mark Johnston, SD Governor Mike Rounds Chief of Staff. "This is a big deal," Johnston said. "When was the last time that the eight basin governors agreed on anything?

The reservoirs all lie within the borders of Montana, North Dakota and South Dakota, and upstream states for years have been at odds with downstream states on the issues of recreation in the reservoirs versus commercial barge navigation downstream. Just three months ago at a summit meeting in Sioux Falls, SD, Montana Gov. Brian Schweitzer laid much of the blame on downstream states' selfishness, singling out Missouri's unwillingness to compromise. Rounds, North Dakota Gov. John Hoeven and Nebraska governor Dave Heineman tried to find gray areas for compromise, but were met with ambivalence from Iowa and Kansas representatives and inflexibility from Missouri.

Paul Johnston, Corps spokesman in Omaha said, "This year's navigation season will be slashed by 61 days, making way for the shortest season since the river's reservoir system was built in 1967". The Corps predicted annual runoff at 16.5 million acre-feet with below-normal mountain snowfall and average rainfall in its May monthly report. That amount is about 9 acre-feet below normal. Johnston said he was pleased to hear of the governors' resolution because issues ranging from drinking water to irrigation are common throughout the basin. "Everybody is sharing in the difficulty caused by drought," Johnston said. "All eight governors (are) recognizing this is a shared problem and supporting legislation that could be a benefit to fish and wildlife in the entire length of the river."

He said further that a Corps program to inundate low-lying sandbars with water to prevent least terns and piping plovers from nesting so low will benefit upstream reservoirs such as Oahe. "If we had conditions similar to last year, it was dry upstream and wet downstream, this operation would save about 1.25 feet of water in Oahe," he said. Reservoirs along the Missouri River currently hold about 35 million acre-feet of water and are near the 31 million acre-feet trigger below which downstream barge navigation would be cancelled.

Sources: Melanie Brandert, *Sioux Falls Argus Leader*, 5/25/05; David Hendee, *Omaha World-Herald*, 5/26/05; and *Greenwire*, 5/26/05

Standards for Ecologically Successful River Restoration

Increasingly, river managers are turning from hard engineering solutions to ecologically based restoration activities in order to improve degraded waterways, yet little agreement exists on what constitutes a successful river restoration effort. Now a group of leading river scientists lead by Emily S. Berhardt, Duke University, has compiled and analyzed more than 37,000 river and stream restoration projects in the U.S. And in the April 29 issue of the journal *Science,* Berhardt and her associates say that more emphasis should be placed on long-term evaluation of project success and on ways for project managers to better share what does and what doesn't work.

According to the group's National River Restoration Science Synthesis (NRRSS) database, the first of its kind, at least $14 billion has been invested in river restoration in the U.S. since 1990. The database includes activities such as restoring wetlands to filter pollution, reforesting riverbanks to curb erosion, recreating the natural river channel to reduce downstream flooding, and removing or redesigning dams to allow fish to migrate freely up and downstream. "River restoration is a science still in its infancy," said Dr. David Galat, a University of Missouri associate professor of fisheries and wildlife and U.S. Geological Survey research scientist involved in the project. "We wouldn't be spending a billion dollars a year if it wasn't needed, but as the science matures, there will be growing pains."

The researchers' analysis determined that more funding should be earmarked for project assessment after project completion. Galat said that in some restoration projects, it takes a decade to see a significant response. Kevin O'Donnell, a University of Missouri graduate student from Havertown, PA, working with Galat said that in general, the group found if some project evaluation was done, there wasn't a consistent approach to the evaluation. "It's the way the funding comes out," he said.

Funding also leads to a definition of success that can be misleading. "Success is often measured by what gets done, not by fulfilling an ecological objective," Galat said, citing an example on the Missouri River. "If funding was granted to build shallow water habitat and it gets built, the project may be deemed a success, even if there is no evaluation showing that the fish it was built for use it."

Coordination among restoration projects also is a concern, O'Donnell said. "You can have different agencies working in the same watershed, even on the same stream, and they won't even know the other one is there." Galat said NRRSS scientists hope to provide guidance and recommendations to those who work to restore rivers and streams. "It's difficult to find a common approach to problem-solving when we know that one size doesn't always fit all," he said, "but pointing fingers doesn't help, either. We need to provide support and tools, illustrating the successes. "We are optimistic that river restoration will improve as future projects are better evaluated for ecological endpoints and this information is used to learn what works and what doesn't," he said.

An aerial view of Weaver Bottoms, an Upper Mississippi River backwater habitat rehabilitation project.

In another recent NRRSS article in the *Journal of Applied Ecology,* this time lead by Dr. Margaret A. Palmer, University of Maryland, the group proposes a series of five criteria for measuring success in river restoration projects, with emphasis on an ecological perspective. These criteria include the following:

- the design of an ecological river restoration project should be based on a specified guiding image of a more dynamic, healthy river that could exist at the site;
- the river's ecological condition must be measurably improved;
- the river system must be more self-sustaining and resilient to external perturbations so that only minimal follow-up maintenance is needed;
- during the construction phase, no lasting harm should be inflicted on the ecosystem; and
- both pre- and post-assessment must be completed and data made publicly available.

Determining if these five criteria have been met for a particular project requires development of an assessment protocol. The scientists suggest standards of evaluation for each of the five criteria and provide examples of suitable indicators. These include the following:

1. Guiding Image - The guiding image should take into account not only the average condition or some fixed value of key system variables (hydrology, chemistry, geomorphology, physical habitat and biology), but should also consider the range of these variables and the likelihood they will not be static. It should explicitly recognize human-induced changes to the system, including changes in the range of key variables. Ideally, this plan should consider local as well as watershed-scale stressors, and should consider how much local restoration can contribute to watershed-level restoration.
Indicators: presence of a design plan or description of desired goals that are not orientated around a single, fixed and invariable endpoint (e.g. static channel, temporally invariant water quality).

2. Ecological Condition - Appropriate indicators of ecological integrity or ecosystem health should be selected based on relevant system attributes and the types of stressors causing impaired ecological conditions. The expected rate of improvement will vary with the degree of impairment, the degree to which restoration reduces key stressors, and the sensitivity of the selected indicators to changes in stressor levels. Change may be relative to a reference site or away from a degraded state.
Indicators: water quality improved; natural flow regime implemented; increase in population viability of target species; percentage of native vs. non-native species increased; extent of riparian vegetation increased; increased rates of ecosystem functions; bioassessment index improved; improvements in limiting factors for a given species or life stage (e.g. decrease in percentage of fines in spawning beds or decrease in stream temperature).

3. Maintenance Needs - System should require minimal on-going intervention and have the capacity to recover from natural disturbances such as floods and fires, and to recover from further human encroachment.
Indicators: few interventions needed to maintain site; scale of repair work required is small; documentation that ecological indicators (see 2 above) stay within a range consistent with reference conditions over time.

4. Construction Impacts - Pre- and post-project monitoring of selected ecosystem indicators (see 2 above) should demonstrate that impacts of the restoration intervention did not cause irreversible damage to ecological properties of the system.
Indicators: little native vegetation removed or damaged during implementation; vegetation that was removed has been replaced and shows signs of viability (e.g. seedling growth); little deposition of fine sediments because of implementation process

5. Pre- and Post-Assessment - Ecological goals for the project should be clearly specified, with assessment is evidence available that post-restoration information or data completed were collected on the ecosystem variables of interest (see 2 above). The level of assessment may vary from simple pre- and post-comparisons to rigorous statistically designed analyses (e.g. using before – after, treatment – control or both types of comparisons) but results should be analyzed and disseminated.
Indicators: available documentation of preconditions and post assessment.

"These standards are intended to help make restoration projects socially as well as ecologically acceptable. They require foresight, coordination and evaluation", Galat said. While working in the Upper Mississippi River Basin, O'Donnell has added more than 700 projects to the NRRSS database. "Thousands more aren't included because they involve private land, and release of sensitive material identifying individual landowners is not permitted by certain agencies," he said. "Our initial results for the basin indicate an overwhelming majority of stream restoration and watershed conservation activities occur because of individual landowner participation."

The NRRSS effort is funded by various public and private entities, including the *National Science Foundation*, the U.S. Geological Survey, *American Rivers* and the *McKnight Foundation*. For more information about the project or its recommendations visit http://nrrss.umd.%20edu/.

Sources: National Public Radio, *Morning Edition*, 4/29/05; E. S. Bernhardt, E.S., et.al. 2005. Synthesizing U.S. river restoration efforts. *Science* 29 April 2005: 636-637; and Palmer, M.A., et.al. 2005. Standards for ecologically successful river restoration. *Journal of Applied Ecology* 2005 42, 208–217

TU Midwest Driftless Area Restoration Plan

Trout Unlimited (TU) announced on April 1 a report entitled, *The Driftless Area: A Landscape of Opportunities*, describing a wide scale stream and river restoration effort in the Midwest's Driftless Area of Wisconsin, Minnesota, Iowa and Illinois.

A View of a Driftless Area Stream

Bypassed by glaciation, the Driftless Area is considered by many to be a national treasure with its unique limestone formations, springs and small trout streams. Land use practices in the 1800s and early 1900s led to wide scale erosion, flooding and the altering of its streams and valleys. Though conditions have improved, impacts from past damages continue today in many forms. The Driftless Area has been the site of restoration activities since the 1930s, when the Works Progress Administration (WPA) implemented the first efforts. Later, the U.S. Soil Conservation Service teamed with agricultural producers to transform much of the region into a system of contoured fields, strip cropping, and terracing. Most recently, local conservation organizations and state agencies have worked together on a small scale to restore sections of trout streams throughout the region.

"Taking the steps necessary to restore the Driftless Area and its streams and rivers would not only make the region an important trout fishing destination, it would ultimately provide its residents with substantial economic and social benefits," said "Duke" Welter, a member of TU's National Board of Trustees from Eau Claire, WI.

The report cites Wisconsin's Kickapoo River and its neighbor stream, the Timber Coulee, as examples of the benefits of stream restoration. Restored in the late 1980s and early 1990s, the two rivers saw a remarkable increase of more than twice as many anglers and a third more canoeists per year between 1993 and 1999. Studies revealed that in 1999, anglers produced a total annual economic impact of $1.5 million, while canoeists produced $1.75 million. In a county with a per capita income at 64% of the state average, the revenue generated from these activities markedly increased the income for a number of small communities by creating 85 jobs and supporting numerous small businesses.

In addition to enhancing the economy of the region, the report notes that restoration would bring major environmental benefits including a reduction in sedimentation in the Upper Mississippi River Basin, to which the watersheds of the Driftless Area drain. Currently the federal government spends nearly $20 million annually on environmental management programs, including extensive dredging projects, in the Upper Mississippi River basin alone, and millions more attempting to address problems associated with the hypoxia zone in the Gulf of Mexico.

The report lists a series of recommendations for moving the restoration process forward, including specific ideas on how to strengthen the planning process, expand local and regional partnerships, improve outreach, and to implement the steps necessary for restoration of its streams and rivers. TU officials said that while the plan is ambitious, it can be accomplished through partnerships between conservation groups, landowners, and local, state and federal officials. An on-line version of the report can be accessed on-line at www.tu.org.

Source: *TU News Release*, 4/1/05
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Deforestation and Cloud Seeding to Increase Runoff

Still struggling with drought on the Colorado River despite a winter of bountiful storms in the Southwest, water managers are dusting off provocative ideas for filling the river — among them, logging mountainsides to wring more runoff out of national forests and seeding clouds to pull more snow out of the sky.

"A lot of things that are controversial will be looked at," said Central Arizona Project general manager Sid Wilson. "We can't do things the way we've always done them. We have to find ways that are creative to address tomorrow's problems." "You just run into a myriad of ideas," he said. Wilson's, agency supplies Colorado River water to Phoenix which would suffer some of the first cuts if a shortage were declared in the lower basin. "There's been a lot of work done on weather modification, vegetation management … just pull together all the information and see what we've got."

But environmentalists say the answer to growing demand is more conservation and more efficient allocation of existing supplies, not efforts to squeeze more water out of the ecosystem. "Those are ludicrous," said Jennifer Pitt of *Environmental Defense's* Colorado office. "We're going to cut down our national forests so we can water our lawns on the front range? Give me a break. There's no way people are going to accept that."

The idea of opening up the forest to generate more runoff in mountain watersheds is not a new one. Experiments date from the early 1900s, and many have been conducted in Colorado, the main source of snowmelt for the Colorado River. "People have talked about it literally for over 100 years, and the reality is it becomes very hard to implement," said Lee H. MacDonald, a Colorado State University natural resources professor who co-wrote an extensive 2003 review of experiments to increase forest water yield. "Socially it's not particularly acceptable…. It's hard to cut enough trees to really make a substantial difference to the flow in the Colorado River."

Although many of the experiments documenting increased water yields involve some form of clear-cutting, Wilson shied away from suggesting that. "Reducing the density of trees and increasing the grasses can improve runoff, but I don't necessarily believe clear-cutting is the answer." The principle of getting more water out of a forest is simple: Remove trees and their roots aren't pulling water out of the ground and transpiring it into the atmosphere. Snowfall isn't trapped on limbs, where it evaporates. A pattern of small clear cuts, also known as patch cuts, allows snow to pile up, adding to the snowpack and spring snowmelt.

But the technique works only in areas that get at least 18 inches of precipitation a year, largely limiting it in the Colorado basin to higher-elevation watersheds that are primarily national forestland. And while studies have shown logging for water can increase runoff in wet years as snowmelt is peaking, it has little effect in dry years or during the summer, researchers say. Moreover, to have a measurable impact, at least a quarter of the vegetation must be cleared from an area, said U.S. Forest Service hydrologist Daniel Neary of the Rocky Mountain Research Station. Conducting that magnitude of timber harvest on a widespread basis would exact a toll, said Rocky Mountain Regional Forester Rick Cables.

A Large Clear Cut

"In the high-elevation forest, to get any appreciable increase in water we would have to remove one out of four trees or clear one out of four acres and then maintain it in an open condition," he said. "The effects on wildlife … scenery, recreational opportunities, the environment would be substantial with such an approach. The Forest Service does not believe there would be public support nor would it be wise to try to maximize a single resource — in this case water — to the potential detriment of other resources."

Cloud seeding to promote snowfall is potentially less controversial. It is already being done to some extent in the Colorado basin and has been practiced in the Sierra Nevada in California for decades by public and private utilities to boost precipitation and hydropower flows. But Bill Cotton, an atmospheric science professor at Colorado State University, said research on its effectiveness has shown mixed results, under certain conditions seeding can increase snow's water content by 8-10%. "If we're going to continue with a drought pattern for the next decade or so, I think there will be an increase, if not in [seeding] operations, then at least research," he said.

Combining cloud seeding with runoff-enhanced logging could add significant flows to the Colorado, said Dennis Underwood, chief executive of the Metropolitan Water District of Southern California. "We need to go back and look at work done previously and see if it's worth pursuing…. If there's no stomach for it, that's fine, but you need to go back and visit it," he said.

Source: Bettina Boxall, *Los Angeles Times*, 4/17/05

Flood Plain Development Insanity

Apparently, the citizens and politicians of the St. Louis area learned nothing from the 1993 and 1995 floods. A recent article in the journal *Science* refers to the area as the "epicenter" of flood plain development, putting billions of dollars' worth of property at risk of catastrophic flooding. Nicholas Pinter, a geologist at Southern Illinois University Carbondale, said that construction in the Missouri and Mississippi river bottoms runs contrary to public policy recommendations made by scientists and government panels in the wake of the 1993 Midwestern flood.

Pinter's article, "*One Step Forward and Two Steps Back on U.S. Floodplains*," summarizes scientific literature and public policy on flood plain development, concluding that St. Louis did not learn the flood's lessons. Citing a 2003 series by the *St. Louis Post-Dispatch*, Pinter pointed out that $2.2 billion in new construction in the St. Louis area has occurred on land that had been underwa-

ter during the flood of 1993. Flood plain development in St. Louis and St. Charles counties alone accounted for 60% of the new construction in areas inundated by the flood.

"These flood plain encroachment projects — both levee building and elevation (of structures) — drive a hydrologic spiral by which flood levels are increased, and by which you'll see more frequent and larger floods," Pinter said in an interview. Many local cities have ignored such warnings, enclosing thousands of acres of land behind large earthen levees designed to withstand large floods.

An aerial view of broken levees during the 1993 Missouri River flood.

But property owners upstream of these large levees should beware because the levees will act like dams, directing the river's flow between them and impounding floodwaters ustream, flooding unprotected lands, some that may have never before been flooded.

The city of Maryland Heights, for example, is planning to erect new business parks in an 8,600-acre stretch of low-lying farmland next to the Missouri River. Neighboring Chesterfield already has a booming commercial corridor on 4,700 acres of flood plain land, including a Wal-Mart, a Bentley car dealership and a new megaplex cinema. St. Charles and St. Peters also have flood plain development projects. Each city has concluded that the benefits of building in the flood plain outweigh the risks. "Obviously, much of the developed world is in what was at one time flood plain," said Mark Levin, city administrator for Maryland Heights. He said the city expected to gain good jobs and revenue from developing the Howard Bend levee area.

But removing more than 13,000 acres from flood plain lands will put at least that many acres at greater risk upstream during minor floods, and add to catastrophic loses during major floods such as that experienced in 1993. David Conrad, a water resources specialist with the *National Wildlife Federation* in Washington, D.C. said that although some cities and states are moving away from flood plain development, flood losses continue to rise nationally. The solution "requires a mindset change," he said. "We have a long history of believing we can reform the river to our convenience rather than learning to live with the river."

But as long as taxpayers continue to subsidize losses during major flooding events, city officials, developers, and politicians with something to gain will never learn to live with the river. The good citizens who rallied in support of the flood victims in 1993 should consider this and perhaps learn their lesson, before the next flood occurs. If disaster assistance is denied after the next flood, this flood plain development insanity may come to a stop!

Source: Sara Shipley, *St. Louis Post-Dispatch*, 4/8/05

ESA Review and Extinctions

Preparing a legislative effort to revamp the Endangered Species Act (ESA), Richard Pombo (R/CA), chairman of the House Resources Committee released a report on May 17 blasting the law as fraught with data problems and failing to recover species. Pombo was joined by Rep. Greg Walden (R/OR), Senate Wildlife Subcommittee Chairman Lincoln Chafee (R/RI) and Sen. Mike Crapo (R/ID) in announcing earlier this year that they would work together to "improve and update" the ESA. In lashing out against the act, the lawmakers have emphasized its record of listing thousands of species but only recovering 10 of them.

Pombo's 84-page report:

- cites hundreds of federal documents, including *Federal Register* notices for delisted or downlisted species, expenditure reports, agency reports to Congress and critical habitat rules;
- highlights problems with data errors, noting that federal officials have discovered new populations or new information on species after their listing that has led to 15 delistings out of 33 total species ever delisted, and half of the downlistings;
- argues that "after three decades more progress should be demonstrable through species that have recovered and been delisted";
- says that 6% of species are improving, 30% are stable, 21% are declining, 2% are possibly extinct and 39% are in uncertain status; and
- finds that federal agencies have spent from $34,000 to almost $9 million on individual species with erroneous data.

"No reasonable person can look at the federal agency numbers here and defend the status quo for the ESA," Pombo said. "It has clearly become a question of *how* we improve this law, not a question of *if*." But Patti Goldman, an attorney with *Earthjustice* in Seattle argued Pombo still may not be giving the act enough credit for keeping species from extinction. "Recovery is obviously the goal, but it may take a long time to achieve," Goldman said. "The immediate question to ask is whether it has prevented extinction so we may be able to get to recovery?" Rodger Schlickeisen, president of *Defenders of Wildlife* agreed.

The *Center for Biological Diversity*, *Earthjustice* and the *Endangered Species Coalition* also argued that scientists have said it will take 30-50 years on average and often over 100 years to see species recovery, while species under the ESA have been listed for only about 15 years, on average. The groups also pointed out that U.S. Fish and Wildlife Service (FWS) data show that more than half of species that have been listed for at least six years with a known trend show signs of being stable or improving.

But Pombo's recommendations include:

- requiring more rigorous criteria for determining endangered and threatened species;
- making a greater distinction between threatened and endangered species listings; and
- allowing an easier, more streamlined process for Section 4 determinations, which allow the agency to grant exemptions for actions that may harass or harm a species if it is "necessary and advisable to provide for the conservation of such species."

Committee staff said this year's ESA efforts are also likely to include some elements of the critical habitat revisions and "sound science" bills they passed last year. Goldman questioned whether those efforts would improve ESA's

recovery rate. "It would seem that if we're not getting to recovery fast enough, [the government] needs to do a lot more to stop activities and spend the money that they need to spend," Goldman said. "If we're not seeing enough recovery, we need to strengthen the act, rather than weaken it."

Goldman and other environmentalists argue further that the current act could more effectively save and recover species if implemented more forcefully. For instance, the FWS in early May released a new "candidate notice of review", saying that 286 species qualify as candidates for listing as threatened or endangered species under the ESA, but that other activities precluded acting on the listings.

More than three-fourths of the species have been awaiting listing for 10 or more years and 26% have been in limbo for 25 or more years, according to an analysis by the *Center for Biological Diversity*. Meanwhile, the costs of litigation are largely unknown, since they are primarily borne by Justice Department attorney salaries. As of last February, federal officials were defending themselves in 33 active ESA lawsuits, covering 43 different species, according to Pombo's report.

"The Endangered Species Act is an effective tool for saving wildlife from the abyss of extinction, and the administration isn't using it," said the *Center for Biological Diversity's* Noah Greenwald. But the Pombo's report notes how costly the process would be for moving all candidate species under ESA protection. The proposed and final listing rules and critical habitat rules and accompanying economic analyses and NEPA assessments can cost more than $550,000 all together. So listing and designating the 286 candidates would cost over $150 million.

Meanwhile in the Senate, ten prominent scientists sent a letter in mid May to the panel that oversees the ESA urging strengthening of the law in the midst of an "extinction crisis." The scientists include Pulitzer Prize-winning author and Harvard University biologist E.O. Wilson, Paul Ehrlich of Stanford University and Stuart Pimm of Duke University. "Currently there is little doubt left in the minds of professional biologists that Earth is faced with a mounting loss of species that equals or exceeds any mass extinction in the geological record," the letter says. "Human activities have brought the Earth to the brink of this crisis." The scientists write that the ESA has therefore taken on greater significance and they are calling on Congress to work to steer the nation and the world "toward a more sustainable path," while strengthening the act and broadening its protections.

Gabriella Chavarria, *Defenders of Wildlife*, who coordinated the scientists' letter said the group targeted the Senate because they "feel a little more hopeful," with regards to the Senate than the House, in part because the Senate panel has thus far been more willing to entertain the ideas of the conservation community.

The letter is one of several efforts by *Defenders* to rally support for bolstering ESA protections. The group also launched an updated Web site**,** which thousands of people have already used to send letters to members of Congress supporting the ESA and criticizing a bill from Rep. Dennis Cardoza (D/CA) that would loosen some of the contentious critical habitat portions of the law.

Sources: *Greenwire*, 5/17 and 5/18/05

Climate Change Update

Global warming may now be the largest cause of species extinctions, and the current rate of species loss is estimated to be 1,000 times faster than at any time in history. Up to 30% of all mammal, bird, and amphibian species are in danger of disappearing by 2050, according to a recent report from the *Millennium Ecosystem Assessment*, an unprecedented 22 million dollar study of Earth's life support systems.

Since 2001, some 1,350 experts from 95 countries working on the *Assessment* have compiled and analyzed all available data on 24 of the planet's vital ecosystems and concluded that 15 are being degraded or used in an unsustainable fashion. In essence, the *Assessment* finds that life on Earth is unraveling. Ecosystems that support all life are being degraded because of the loss of biodiversity.

''The living machinery of the Earth has a tendency to move from gradual to catastrophic change with little warning,'' says the study. Some species are more important than others, and like a house of cards: removing some cards — or in this case, species — makes the structure weaker but it remains standing. But remove one or two other, more critical cards, and it collapses. ''Everything is connected to everything else,'' said Rod Mast, vice president of the U.S.-based environmental group *Conservation International*. This interconnectedness is the fundamental principle of ecology.

For example, forests produce oxygen, clean water, prevent erosion and flooding, capture excess carbon dioxide, and provide food and habitat for many species. Logging all the trees in a forest ends up eliminating many species of plants, animals, birds, and insects. It also results in a loss of those ecosystem services for many years, and in some cases permanently because reduced biodiversity makes it difficult for the forest to recover.

For example, in Colorado's high country since 1991, researcher John Harte has used artificial light to increase the temperature of a hillside meadow near the town of Gothic by 3 to 4 degrees, an increase estimated by climate models to occur by 2040. In the heated 330 square foot plot, Harte has found faster snow-melt, decreased moisture in the summer and a change in vegetation. Funded by the *National Science Foundation*, the research confirms what studies have predicted could happen to the region should temperatures rise. "Places like this will look much more like the sagebrush meadows around Gunnison," said Harte. "We're talking about a completely different future for this region."

Similarly the comprehensive 240-page *Rocky Mountain/Great Basin Regional Climate-Change Assessment*, prepared for the U.S. government by more than 125 researchers predicted:

- Big reductions in the mountain snowpacks that provide most of the region's water;
- Significant summer drying and reduced soil moisture in Colorado's mountain forests, along with lower summer flows in rivers and streams;
- An earlier wildfire season, more droughts, and more large-scale insect outbreaks in forests;
- Reduced habitat for native cold-water fish such as the cutthroat trout; and
- Shorter ski seasons and a higher snow line, placing low-elevation resorts at risk.

Also, a dwindling ice pack in the Arctic may lead to a more meager snowpack in the Rockies, according to two other new studies. The disappearing Arctic ice pack — which is likely to reach record lows this summer — may lead to a shift in the jet stream that will pull winter storms north in coming decades. "In the Rockies, we see about 17% less rain and snow, and ... a lot of your water comes from that," said Lisa Sloan, a professor of earth sciences at the University of California at Santa Cruz who ran the computer-modeling study. "It was a result we were just astounded by," she said.

The new findings, based on eight climate models, buttress earlier work published in *Geophysical Research Letters* by Sloan and Jacob Sewall, also a University of Santa Cruz researcher. "In seven of eight, they produce this very dry bull's-eye in the Western U.S., and it's wetter in southern Alaska, the Canadian Rockies," Sewall said. "This result appears very robust. ... If you want anything better, you need to sit around and wait 50 years and watch."

Some of the Arctic sea-ice data used in the study came from the National Snow and Ice Data Center in Boulder. There, polar researcher Mark Serreze has been watching the floating ice cover shrink for the last five years, a trend not seen in the previous 25 years of satellite records. Not only is ice retreating, Serreze said, but what ice is left appears to be much thinner, and this summer's low point in September will likely be a record- breaker. "We're getting to some kind of tipping point here," Serreze said. "The sea ice can't recover."

That prediction inspired Sewall and Sloan to run computer models forward in two scenarios: average winter ice cover and a melting of about 20%, which is expected by 2050. With part of its computer-generated ice cover gone, the relatively warm Arctic Ocean poured heat into the frigid air, changing regional pressure systems and sending ripples through the wavy jet stream, Sewall said. Winter storms headed farther north, drying the West and dampening Canada.

In their models, Sewall and Sloan ignored the fact that the greenhouse gas carbon dioxide is likely to continue to increase in the atmosphere, possibly causing greater warming. "If you add that, greenhouse warming is going to cause increased temperature and more drying of the soil. The results could potentially be quite bad," Sewall said. Richard Alley, a climate researcher at Pennsylvania State University, said the new Arctic-West link is tantalizing, but it needs more confirmation. "This is one of those things we'd better figure out," he said. "Because if we go to a completely ice-free Arctic, we have a very different world."

Some experts say global warming is also changing wooded regions across the U.S., and timber-industry workers are among those following the phenomenon amid concern it could eventually affect their livelihoods. Glacier National Park is also expected to be devoid of its namesake ice formations by 2040, according to U.S. Geological Survey scientists. What's more, the Earth's Northern Hemisphere has been growing greener in the past two decades as temperatures rise, according to NASA satellite images.

For the region's forests, these changes could have serious consequences, said Steven Running, an ecology professor from the University of Montana. They include increased insect plagues and less snowpack, which aids wildfire prevention. "This isn't just one or two years of normal variability — this is a substantial trend over a half-century," he said. The rapid changes in Western forests are difficult to deny, said Ed Shepard, assistant director of the U.S. Bureau of Land Management. But he said he thinks increases in insects and fires are the result of a century of fire suppression. The ratio of tree species in Idaho forests has been altered dramatically by fire prevention, he said, citing a 1995 University of Idaho study.

There's very little debate in Canada about warmer winters, drier summers and how they may be affecting forests, said Greg McKinnon, a Canadian Forest Service scientist who directs a national research effort on the effects of climate on forests. In Edmonton, Alberta, where McKinnon works, aspen leaves are emerging three weeks earlier than a century ago, he said.

Climate change is also playing havoc with the timing of seasons in Britain and could drastically alter the landscape, according to a comprehensive British study. Frogs have begun spawning as early as October, oaks are coming into leaf three weeks earlier than they were 50 years ago and there were an unprecedented 4,000 sightings of bumblebees by the end of January this year.

Scientists have calculated that spring starts around six days earlier for every 1 ^{o}C temperature rise, but not all species are affected in the same way. For example for every 1 ^{o}C temperature rise, oak trees come into leaf 10 days earlier compared to four days earlier for the ash, its main competitor for space. In an example of the ecological balance being upset, these changes also affect caterpillars, which are developing earlier to meet the need to feed on the trees' young leaves. This may also have an effect on the migratory patterns of birds that feed on the insects, which can more readily adapt to climate change. "The findings suggest that there won't be a smooth progression towards a warmer climate, with all species advancing in unison, but rather that different responses may disrupt the complex linkages in nature", said Tim Sparks of the *UK Phenology Network*.

Researchers led by James Hansen, one of NASA's top climatologists, looked at the planet's "energy imbalance" — the difference between the amount of heat absorbed by Earth and the amount radiated out into space — and compared those results with predictions of leading climate models. Hansen and his associates concluded that the unusual magnitude of the warming trend could not be explained by natural variability, but instead fit precisely in line with theories suggesting that human activity — the dominant "forcing agent" driving the computerized climate models — is responsible.

"This energy imbalance is the 'smoking gun' that we have been looking for," Hansen said in a prepared summary of the study, which was published in a late April edition of the journal *Science*. "There can no longer be substantial doubt that human-made gases are the cause of most observed warming," he said. The analysis used information from a variety of sources, but is the first to make use of data from the *Argo Project*, an international fleet of 3,000 robotic ocean platforms that since 2000 have been recording ocean temperatures to depths of more than a mile.

Although the planet is now soaking up more energy from sunlight than it is reflecting back to space in the form of heat radiation, much of the excess energy

remains effectively hidden in the oceans, the study found. Just as the sands on a beach warm faster than the waters offshore, oceans respond more slowly to temperature changes than land masses. But the heat trapped in the oceans will eventually manifest itself, with significant consequences for the world's climate, the scientists wrote. As a result, the average global temperature, which has increased by about 1 °F over the last century, will do so again over the next century, simply based on the heat stowed away in the oceans. In addition to increasing global temperatures, the warming could lead to an acceleration of the ice sheet disintegration taking place in parts of the polar regions, and even a rapid rise in sea levels, the authors concluded. Sea levels have risen about 1.25 inches in the last decade, twice the rate of the preceding century, partly because the heat content of the oceans has caused the water to expand.

Based on major climate shifts in the planet's history, Hansen estimates that if temperatures increased beyond 1.8 °F over current levels, large-scale sea level increases could take place. He argued that represents the threshold that human beings should strive not to exceed. Hansen estimated that if humans could slash the current amount of carbon dioxide in the atmosphere in half, or eliminate potent methane emissions, the planet's heat would fall back into equilibrium. But such reductions, he said, are unrealistic, and thus the world probably will become warmer.

Meanwhile, mayors from cities as liberal as Los Angeles and as conservative as Hurst, TX, representing nearly 29 million citizens in 35 states, are pledging to have their cities meet what would have been a binding requirement for the nation had the Bush administration not rejected the Kyoto Protocol: a reduction in heat-trapping gas emissions to levels 7% below those of 1990, by 2012.

Seattle Mayor Greg Nickels (D) said he decided to form the bipartisan mayors' coalition on the Kyoto Protocol when it took effect in February without U.S. support. He said that many of the mayors said they were acting out of concern for the economic vitality of their cities.

Mr. Nickels, for example, pointed out that the dry winters and the steep decline projected in the glaciers of the Cascade range could affect Seattle's supply of drinking water and hydroelectric power. The mayor of low-lying New Orleans, C. Ray Nagin (D), said he joined the coalition because a projected rise in sea levels "threatens the very existence of New Orleans." In Hawaii, the mayor of Maui County, Alan Arakawa (R), said he joined because he was frustrated by the administration's slowness to recognize the scientific consensus that climate change was happening because of human interference. "I'm hoping it sends a message they really need to start looking at what's really happening in the real world," Mayor Arakawa said. Mayor Michael R. Bloomberg brought New York City into the coalition, the latest Republican mayor to join.

Mayor Nickels said it was no accident that most cities that had joined were in coastal states. The mayor of Alexandria, VA, is worried about increased flooding, while mayors in Florida are worried about hurricanes. But Mr. Nickels has also found supporters in the country's interior. Jerry Ryan (R) mayor of Bellevue, NE, said he had signed on because of concerns about the effects of droughts on his farming community. Mr. Ryan described himself as a strong Bush supporter, but said he felt that the president's approach to global warming should be more like his approach to terrorism. "You've got to ask, 'Is it remotely possible that there is a threat?' " he said. "If the answer is yes, you've got to act now."

Former U.S. EPA Administrator Christie Whitman, who served under the Bush Administration from 2001 to 2003 said that the Bush administration's approach to climate change "has definitely hurt us.". In an interview with *Environmental Science & Technology*, Whitman said: "I don't think that we appreciate how climate change is an enormous issue to the rest of the world." "The problem is that instead of stating that we felt the (Kyoto) treaty was flawed but that we understood the rest of the world's concerns and want to work with them, we just said, 'We're outta here.' And that's the message that went out to the rest of the world: The United States just didn't care and was flipping the bird," she said. She added, "in fairness, I think we can do more" on climate change, "There is a lot we can do".

Sources: Stephen Leahy, *Inter Press Service News Agency*, 5/18/05; Jeremy Lovell, *Reuters*, 3/30/05; A*P/The Seattle Times*, 4/12/05; Matthew Beard, *The London Independent*, 4/15/05; Katy Human, *Denver Post*, 5/20/05; Mike Toner, *The Atlanta Journal-Constitution*, 4/29/05; Tim Radford, *The (London) Guardian*, 4/29/05; Miguel Bustillo, *Los Angeles Times*, 4/29/05; Richard Black**,** *BBC News Online*, 4/28/05; Carl T. Hall, *San Francisco Chronicle*, 4/29/05; and *Greenwire*, 4/1, 4/15, 4/20; 4/29; 5/19; and 5/20/05

Tennessee River Paddlefish Report

Researchers at Tennessee Technological University in Cookeville, TN recently released a study of paddlefish in the Kentucky Lake reach. A .pdf version of the report can be found on-line at: http://www.tntech.edu/fish/Reports/Paddlefish%20Final%20Report.pdf.

Contact: Dr. Phil Bettoli, Tennessee Cooperative Fishery Research Unit, Box 5114, Tennessee Tech University, Cookeville, TN 38505; (931) 372-3094; PBettoli@tntech.edu

Meetings of Interest

Jul 6-11: American Society of Ichthyologists and Herpetologists, Tampa, FL. Contact Mark Pyron, MPYRON@bsu.edu, (765) 285-8852.

Jul 12-14: River and Lake Restoration: Changing Landscapes, UCOWR/NIWR conference (Universities Council On Water Resources). See: http://ucowr.siu.edu/

Jul 11-15: International Symposium on Assessing the Ecological Status of Rivers, Lakes and Transitional Waters. Hull International Fisheries Institute, University of Hull, England in

collaboration with European Inland Fisheries Advisory Commission (EIFAC) and the Environment Agency (UK). Contact: Prof. Ian Cowx. See: www.hull.ac.uk/hifi

Jul 18-22: Seventh International Congress on the Biology of Fish, St. John's, Newfoundland, Canada. Contact: Bill Driedzic, wdriedzic@mun.ca.

Aug 16-19: Second North American Lake Trout Symposium, Yellowknife, Northwest Territories, Canada. See: www.laketrout symposium2005.ca/. Contact: Dave Tyson, tysond@dfo-mpo.gc.ca
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Sep 11-15: 135th Annual Meeting of the American Fisheries Society, Anchorage, AK. Contact: Betsy Fritz, bfritz@ fisheries.org, (301) 897-16, ext. 212.

Sep 11-23: Environmental Leadership Course, National Zoo's Conservation and Research Center, Front Royal, VA. See www.si.edu/simab. Contact Jennifer Sevin, sevinj@si.edu.

Sep 12-18: The Society for Ecological Restoration World Conference on Ecological Restoration: A Global Challenge, Zaragoze, Spain. See www.ser.org/ content/2005Conference.asp

Oct 16-19: 59th Annual Conference of the Southeastern Association of Fish and Wildlife Agencies: When Practice Meets Policy, St. Louis, MO. See www.sdafs.org.

Oct 17-20: Fourth National Conference: Nonpoint Source and Stormwater Pollution Education Programs, Chicago, IL. Contact Bob Kirschner, bkirschn@chicagobotanic.org.

Oct 17-20: Organization of Fish and Wildlife Information Managers 2005 Annual Meeting and Conference, Tallahassee, FL. See www.ofwim.org.

Oct 25-28: 8th Annual Wetlands and Watersheds workshop: Aquatic systems and Water Quality, Atlantic City, NJ. See www.wetlandsworkgroup.org. Contact Frank Reilly, Jr., frank@wetlandswork group.org, (540) 286-6072.

Nov 9-11: 25th Annual Symposium of the North American Lake Management Society: Lake Effects: People/Water Exploring the Relationship, Madison, WI. See www.nalms.org. Contact Carol Winge, winge@nalms.org, (608) 233-2836.

Nov 13-17: 26th Annual Meeting of the Society of Environmental Toxicology and Chemistry: Environmental Science in a Global Society: SETAC'S Role in the Next 25 Years, Baltimore, MD. See www.setac. org.

Dec 5-7: Environmental Results Using Market-Based Approaches, Atlantic City, NJ. Contact Andrew Seligman, seligman.andrew@epa.gov, 215/814-2097.

Feb 8-12, 2006: Southern Division American Fisheries Society Spring Meeting, San Antonio, TX. See http:// www.sdafs.org/meetings/2006. Contact Dave Terre, dave.terre@tpwd.state.tx.us, 903/566-1615.

Jun 25-28, 2006: International Conference on Rivers and Civilization: Multidisciplinary Perspectives on Major River Basins, La Crosse, WI. Contact: Jim Wiener, University of Wisconsin-La Crosse, (608) 785-6454, wiener.jame@ uwlax.edu

Aug 6-11, 2006: 8th International Conference on Mercury as a Global Pollutant, Madison WI. See www.mercury 2006.org. Contact James Wiener, weiner.jame@ uwlax.edu, 608/785-6454.

Congressional Action Pertinent to the Mississippi River Basin

Climate Change

S. J. RES. 5. Feinstein (D/CA) and 13 Co-Sponsors. Expresses the sense of Congress that the U.S. should act to reduce greenhouse gas emissions.

S. 245. Collins (R/ME) and 5 Co-Sponsors. Provides for the development and coordination of a comprehensive and integrated U.S. research program that assists the people of the U.S. and the world to understand, assess, and predict human-induced and natural processes of abrupt climate change.

S. 342. McCain (R/AZ) and 12 Co-Sponsors and **H.R. 759.** Gilchrest (R/MD) and 25 Co-Sponsors. Provides for a program of scientific research on abrupt climate change, to accelerate the reduction of greenhouse gas emissions in the U.S. by establishing a market-driven system of greenhouse gas tradeable allowances, to limit greenhouse gas emissions in the U.S. and reduce dependence upon foreign oil, and ensure benefits to consumers from the trading in such allowances.

S. 386. Hagel (R/NE) and 3 Co-sponsors. Directs the Secretary of State to carry out activities that promote the adoption of technologies that reduce greenhouse gas intensity in developing countries, while promoting economic development, and for other purposes.

S. 387. Hagel (R/NE) and 3 Co-Sponsors. Amends the Internal Revenue Code of 1986 to provide tax incentives for the investment in greenhouse gas intensity reduction projects, and for other purposes.

S. 388. Hagel (R/NE) and 3 Co-sponsors. Amends the Energy Policy Act of 1992 to direct the Secretary of Energy to promote the adoption of technologies that reduce greenhouse gas intensity and to provide credit-based financial assistance and investment protection for projects that employ advanced climate technologies or systems, to provide for the establishment of a national greenhouse gas registry, and for other purposes.

H. R. 955. Olver (D/MA) and Gilchrest (R/MD). Amends the Clean Air Act to establish an inventory, registry, and information system of U.S. greenhouse gas emissions to inform the public and private sectors concerning, and encourage voluntary reductions in, greenhouse gas emissions, and for other purposes.

Conservation

S. 260. Inhofe (R/OK) and **H. R. 2018.** Sullivan (R/OK). Authorizes the Secretary of the Interior to provide technical and financial assistance to private landowners to restore, enhance, and manage private land to improve fish and wildlife habitats through the Partners for Fish and Wildlife Program.

S. 339. Reid (D/NV) and 4 Co-Sponsors and **H. R. 731.** Udall (D/CO) and Otter (R/ID). Reaffirms the authority of States to regulate certain hunting and fishing activities.

S. 421. Lott (R/MS) and Kohl (/WI). Reauthorizes programs relating to sport fishing and recreational boating safety, and for other purposes.

H. R. 524. Berkley (D/NV). Amends the Internal Revenue Code of 1986 to provide incentives for the conservation of water.

Endangered Species Act (ESA)

H. R. 93. Gilchrest (R/MD). Assists in the conservation of flagship species throughout the world.

H.R. 1299. Cardoza (D/CA) and 16 Co-sponsors. Amends the ESA to reform the process for designating critical habitat under that Act.

H. R. 1837. Flake (R/AZ) and 4 Co-Sponsors. Amends the ESA to establish limitations on the designation of critical habitat, and for other purposes.

Energy

H. R. 140. McHugh (R/NY). Promotes use of anaerobic digesters by agricultural producers and rural small businesses to produce renewable energy and improve environmental quality.

H. R. 174. Millender-McDonald (D/CA). Encourages greater use of geothermal energy resources.

H. R. 2064. Udall (D/CO). Assures that development of certain Federal oil and gas resources will occur in ways that protect water resources and respect the rights of the surface owners, and for other purposes.

Federal Water Pollution Control Act (FWPCA) Amendments:

S. 912. Feingold (R/WI) and 8 Co-Sponsors and **H.R. 1356.** Oberstar (D/MN) and 125 Co-Sponsors. Amends the FWPCA to clarify the jurisdiction of the U.S. over waters of the U.S.

H. R. 74. Davis (R/VA). Amends the FWPCA to impose limitations on wetlands mitigation activities carried out through the condemnation of private property.

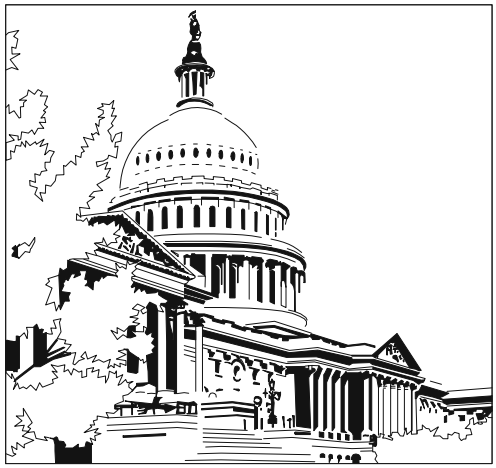
Invasive Species

S. 363. Inouye (D/HI) and 3 Co-Sponsors. Amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 to establish vessel ballast water management requirements, and for other purposes.

S. 507. De Wine (R/OH) and 4 Co-Sponsors. Establishes the National Invasive Species Council, and for other purposes.

S. 770. Levin (D/MI) and 12 Co-Sponsors and **H.R. 1591**. Gilchrest (R/MD) and 4 Co-Sponsors. Amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 to reauthorize and improve that Act.

H. R. 489. Pearce (R/NM). Provides for an assessment of the extent of the invasion of Salt Cedar and Russian Olive on lands in the Western U.S. and efforts to date to



control such invasion on public and private lands, including tribal lands, to establish a demonstration program to address the invasion of Salt Cedar and Russian Olive, and for other purposes.

H. R. 1592. Ehlers (R/MI) and 5 Co-Sponsors. Establishes marine and freshwater research, development, and demonstration programs to support efforts to prevent, control, and eradicate invasive species, as well as to educate citizens and stakeholders and restore ecosystems.

H. R. 1593. Ehlers (R/MI). Establishes the National Invasive Species Council, and for other purposes.

Mining

S. RES. 64. Jeffords (I/VT) and 7 Co-Sponsors. Expresses the sense of the Senate that the U.S. should prepare a comprehensive strategy for advancing and entering into international negotiations on a binding agreement that would swiftly reduce global mercury use and pollution to levels sufficient to protect public health and the environment.

S. 961. Rockefeller (D/WV) and **H. R. 1600.** Cubin (R/WY) and 4 Co-Sponsors. Amends the Surface Mining Control and Reclamation Act of 1977 to reauthorize and reform the Abandoned Mine Reclamation Program, and for other purposes.

H. R. 905. Cubin (R/WY). Amends the Mineral Leasing Act to provide for the development of Federal coal resources.

H. R. 1165. Kanjorski (D/PA) and 6 Co-Sponsors. Amends the Internal Revenue Code of 1986 to allow a credit against income tax to holders of bonds issued to finance land and water reclamation of abandoned mine land areas.

H. R. 1265. Udall (D/CO). Provides a source of funding for the reclamation of abandoned hardrock mines, and for other purposes.

H. R. 1266. Udall (D/CO) and Salazar (D/CO). Facilitates the reclamation of abandoned hardrock mines, and for other purposes.

Public Lands

H. R. 599. Udall (/CO) and Tancredo (R/CO). Provides a source of funds to carry out restoration activities on Federal lands under the jurisdiction of the Secretary of the Interior or the Secretary of Agriculture, and for other purposes.

H. R. 975. Tancredo (R/CO) and 5 Co-Sponsors. Provides consistent enforcement authority to BLM, NPS, USFWS, and FS to respond to violations of regulations regarding the management, use, and protection of public lands under the jurisdiction of these agencies, and for other purposes.

Water Resources

S. 232. Smith (R/OR). Authorizes the Secretary of the Interior, acting through the Bureau of Reclamation, to assist in the implementation of fish passage and screening facilities at non-Federal water projects, and for other purposes.

S. 353. Conrad (D/ND) and Dorgan (D/ND). Amends the Water Resources Development Act of 1999 to direct the Secretary of the Army to provide assistance to design and construct a project to provide a continued safe and reliable municipal water supply system for Devils Lake, ND.

S. 728. Bond (R/MO) and 17 Co-Sponsors. Provides for the consideration and development of water and related resources, to authorize the Secretary of the Army to construct various projects for improvements to rivers and harbors of the U.S., and for other purposes.

S. 753. Feingold (R/WI). Provides for modernization and improvement of the Corps of Engineers, and for other purposes.

S. 802. Domenici (R/NM) and 10 Co-Sponsors and **H. R. 1386.** Mr. Hastings (/FL) and 24 Co-sponsors. Establishes a National Drought Council within the Department of Agriculture, to improve national drought preparedness, mitigation, and response efforts, and for other purposes.

S. 1017. Chaffee (R/RI) and 10 Co-Sponsors. Reauthorizes grants for the water resources research and technology institutes established under the Water Resources Research Act of 1984.

H. CON. RES. 120. Schakowsky (D/IL) and 23 Co-Sponsors. Expresses the sense of the Congress with regard to the world's freshwater resources.

H. J. RES. 3. Davis (R/VA). Acknowledges a long history of official depredations and ill-conceived policies by the U.S. Government regarding Indian tribes and offers an apology to all Native Peoples on behalf of the U.S.

H. R. 109. Herseth (D/SD). Provides compensation to the Lower Brule and Crow Creek Sioux Tribes of South Dakota for damage to tribal land caused by Pick-Sloan Projects along the Missouri River.

H. R. 135. Linder (R/GA) and 8 Co-Sponsors. Establishes the "Twenty-First Century Water Commission" to study and develop recommendations for a comprehensive water strategy to address future water needs.

H. R. 391. Leach (R/IA). Directs the Secretary of the Army to convey the remaining water supply storage allocation in Rathbun Lake, Iowa, to the Rathbun Regional Water Association.

H. R. 487. Pearce (R/NM). Imposes limitations on the authority of the Secretary of the Interior to claim title or other rights to water absent specific direction of law or to abrogate, injure, or otherwise impair any right to the use of any quantity of water.

H. R. 494. Rohrabacher (R/CA). Amends the Water Resources Development Act of 1986 to expand the authority of non-Federal interests to levy harbor fees.

H. R. 1368. Burgess (R/TX) and 2 Co-sponsors. Provides the Secretary of the Army with additional and enhanced authority with respect to water resources projects, and for other purposes.

Source: http://www.gpoaccess.gov/bills/index.html

River Crossings

Mississippi Interstate Cooperative Resource Association
P.O. Box 774
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